QUIVIRA NATIONAL WILDLIFE REFUGE

Stafford, Kansas

ANNUAL NARRATIVE REPORT

Calendar Year 1987

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVAL

QUIVIRA NATIONAL WILDLIFE REFUGE

Stafford, Kansas

ANNUAL NARRATIVE REPORT

Calendar Year 1987

James E McCallum 5/20/88 5/27/88

Refuge Manager Date Refuge Supervisor Date

Ralph F. Frie 5/27/88

Regional Office Approval Date

INTRODUCTION

Quivira National Wildlife Refuge is located in Stafford, Reno and Rice counties in south-central Kansas. The establishment of the refuge was approved by the Migratory Bird Conservation Commission on May 3, 1955 and acquisition of the 21,820 acres was completed in 1969. The natural and developed marshes on the refuge provide resting and feeding areas for spring and fall migrating waterfowl and wintering habitat for mallards and Canada geese. Endangered species, other migratory birds, resident wildlife and the public benefit from Quivira's varied habitats.

The area is relatively flat with soils ranging from light sands to clay loam and from neutral to alkaline. Thirty refuge water units are filled naturally or by water diverted from Rattlesnake Creek through a system of canals and water control structures. Refuge waters are slightly to moderately saline and are highly productive of small invertebrates, small fish and submergent plants. When all the units are at capacity, the refuge contains about 5,000 surface acres of water.

A winter wheat-milo-fallow rotation is practiced on 1,300 acres by neighboring farmers in a cooperative farming program. The 13,000 acres of rangeland include wet meadows of saltgrass and cordgrass, subirrigated sites with big bluestem, switchgrass, indiangrass and eastern gamagrass, and dry sandy uplands covered with little bluestem, sandlove grass, sand reedgrass. The trees in numerous shelter belts and old farmstead sites provide additional diversity of habitat. The Santana Research Natural Area has been set aside to maintain a small example of the original prairie that greeted the first pioneers. This 363 acre area contains stabilized sand dunes and 15 acres of century-old cottonwoods originally planted as a timber claim.

Spring and fall are the best seasons to visit Quivira Refuge. Wildlife, especially waterfowl and shorebirds, are at their peak numbers at these times. Hunting and fishing are permitted on the refuge in accordance with state seasons.

The combination of habitats at Quivira National Wildlife Refuge make an important contribution toward ecosystem diversity and the well being of our wildlife heritage in Kansas and the Central Flyway.

INTRODUCTION

Page Number

TABLE OF CONTENTS

Page Number

G. WILDLIFE

H. PUBLIC USE

Page Number

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

A. HIGHLIGHTS

Water! Water! Water! Heavy rainstorms in March tax our ability to handle the high flows (section B).

Rehabilitation of water control structures continues to progress with 15 structures completed this year (Section I.2.)

Whooping Crane visitation sets new records (Section G.2.).

A new refuge Rangeland Management Plan is completed (Section D.2.).

Interest in oil drilling and exploration increases (Section J.2.).

B. CLIMATIC CONDITIONS

January and February weather would have to be considered mild when compared to the norm. Altho there were several cold fronts that brought light snow, intervening warm periods quickly cleared away the white stuff. Ice cover on large water units was thin and was gone by the end of January

March was wet and wild. Ground soaking rains at mid-month set the stage for flood conditions when 4.34 inchs of precipitations fell on the 23rd and 24th. Rattlesnake Creek was out of its banks thru much of the refuge for over a week. The creek crested a 8.25 feet at the Zenith gage where the creek enters the refuge. The U.S. Geological Survey measured the flow on the 27th at 1,020 cubic feet per second with the gage at 7.94 feet. This is in comparison to normal flows of 30 to 50 c.f.s. when the creek is around 4.00 feet on the gage. Much of the precipitation fell as snow in the western parts of the watershed. This prevented the flows from being even higher but extended the period of high flows several days longer than normal for this amount of rain. An additional 1.09 inches of rain on the 28th kept the creek flowing high well into April.

The remainder of the year's weather was more normal altho precipitation remained above average. One hundred percent of normal annual precipitation was reached by July 18. The end-of-year total of 31.75 inches was 132% of normal. This was the third consecutive year that precipitation was 25% or more above average.

Snowfall was recorded from three storms in late November and December. In each instance warmer weather quickly arrived to melt the accumulations.

Temperatures were about normal thru out the year. The minimum of 7° was recorded on January 19. The year's high was 104° on August 2 and 3. There were 14 days above 100°. The last spring freeze was on April 5. Some trees and shrubs were already in flower and were damaged by the freeze. First fall freeze was on November 9 altho local frosts on October 3 killed most refuge grain sorghum and effectively ended the growing season.

Heavy rain and wet snow in late March brought high water and flood conditions to Rattlesnake Creek. Run-off from Big Salt Marsh and the surrounding area crossed the Marsh Road in several places for over a week.

3/87; Cartlidge

Damage from the flood waters was not major but did require many staff days to repair. Adding new material to the Marsh Road, shown here, and to bridge ends, culverts and water control structures was all handled by Force Account.

3/87; Cartlidge

TABLE I

1988 WEATHER DATA

Month	Snow	Precip.	Average* Precip.	Max. Temp.	Min. Temp.
January	14.0"	1.23"	0.57"	65	7
February	1.0"	1.60"	0.84"	69	24
March	7.5"	7.09"	1.40"	76	13
April		1.25"	2.19"	90	31
May		5.20"	3.77"	90	50
June		4.81"	3.67"	101	53
July		2.72"	2.93"	103	55
August		4.37"	2.59"	104	54
September		1.08"	2.42"	95	45
October		.63"	1.80"	89	34
November	4.0"	.60"	.93"	78	23
December	11.5"	1.17"	.77"	62	8
TOTALS	38.0"	31.75"	23.88"		

* Average for period 1931-1980. All figures were recorded at the U.S. Weather Bureau Station at Hudson, Kansas, 8 miles west of the refuge.

C. LAND ACQUISITION

2. Easements

In November the refuge staff inspected for wetlands a Farmers Home Administration tract near the refuge. A map of the tract delineating the wetlands was prepared and submitted to the Fish and Wildlife Enhancement Office at Manhattan, Kansas. That office then made a recommendation to FmHA that a deed restriction be included when the tract is sold to preserve the delineated wetlands under an easement enforced by the Fish and Wildlife Service. We have not received word on the action taken on this recommendation.

D. PLANNING

2. Management Plans

Safety Plan. A new and revised station safety plan was completed and submitted for approval in January.

Oil and Gas Management Plan. Policy and guidelines for refuge staff response to oil and gas activities on the refuge was completed in February and submitted to the Regional Office for review and comment. In light of the Director's memorandum of April 24, 1987, regarding regulation of privately held mineral rights on refuges, the plan was returned to the refuge for revision. This revision is not yet complete.

Rangeland Management Plan. A new management plan for refuge rangelands was completed in September. The plan proposes a more holistic, ecologically sound method of management of these habitats. Grazing, rest, and fire are the primary manipulative tools that will be used. The plan emphasizes use of livestock to manipulate and improve wildlife habitat while at the same time producing a profit for the grazing permittee. The approach is much more management intensive than the previously used grazing methods and will require much closer coordination and cooperation between grazing permittees and the refuge staff.

Wildlife Inventory Plan. The refuge has never had a written wildlife inventory plan. Work commenced on a new plan during the summer but was stymied by the transfer of Assistant Manager Orthmeyer.

Water and Wetland Management Plan. The purpose of this plan is to provide well defined goals for wetland and water management on the refuge and a base for continuity of management when staff changes occur. Writing on the plan began in the fall and continued at year's end. It is expected that this plan will mesh closely with the rangeland and cropland management plans to provide unified guidance to refuge habitat management activities.

Hunting and Fishing Plan. Work was begun in the fall to amend the Hunting and Fishing Plan to permit hunting of deer and wild turkey on the refuge. The amendments will be submitted for approval in February.

4. Compliance with Environmental and Cultural Resource Mandates

Three Section 7 consultations occurred this year all relating to oil and gas activities. Formal intra-Service consultation was initiated on a plan by General Oil Company to drill an additional oil well on the Whooping Crane # 1 pad in the Big Salt Marsh. An opinion submitted by Fish and Wildlife Enhancement on November 25 concluded that there would be no jeopardy by this project to endangered species using the refuge.

Informal consultation was conducted on two other projects, a seismograph survey on Tract 21 (Section 3, T22S, R11W) followed by drilling of an oil well on the same area.

These projects are discussed further in more detail in Section J.2.

A study of the ecology of the interior least tern continued this year by Dr. Roger Boyd of Baker University. He has found that, altho these endangered birds find Quivira highly attractive, their success in raising young to flight stage is very low.

7/87; Boyd

5. Research and Investigations

Quivira NR 87 - "Population Ecology of Least Terns and Snowy Plovers." Dr. Roger L. Boyd, Baker University.

Work on this project continued into its eighth year. The study area encompasses much of northern Oklahoma and portions of southern Kansas including Quivira. The study has been tracking reproductive success of these birds on the refuge and other nesting locations in the study area.

E. ADMINISTRATION

1. Personnel

Table II

Name	Title	Appntmnt	Grade	EOD -- Term.
1. James E. McCollum	RefMgr	PFT	GS-11	08/19/84
2. Karen S. Cartlidge	AsstRefMgr	PFT	GS-09	07/22/84
3. Jackie G. Jones	RefAsst	PFT	GS-05	04/15/84
4. Gary L. Sullivan	AsstRefMgr	PFT	GS-07	6/9/85-2/7/87
5. Dennis L. Orthmeyer	AsstRefMgr	PFT	GS-07	05/25 -09/28/87
6. Carl D. Marks	MaintWrkr	PFT	WG-08	07/19/74
7. Stanley A. King	MaintWrkr	PFT	WG-07	09/27/82
8. Gary F. (Pete) Meggers	Laborer	TFT	WG-02	01/01 - 12/31/87
9. Daniel R. Schaad	RangeTech.	TFT	GS-05	04/24 - 08/01/87
10. Henry H. Hall	MaintWrkr	TInt	WG-07	03/01 - 12/31/87
11. Brian J. Heath	Range Aid	TFT	GS-04	05/26 - 12/19/87
12. Jon P. Foltmer	Laborer	TInt	WG-02	07/05 - 10/31/87
13. Fred R. Nienke	Laborer	TInt	WG-02	06/15 - 11/14/87
14. Randall R. Stout	Laborer	TInt	WG-02	08/02 - 10/15/87

Gary Sullivan transferred to Benton Lake National Wildlife Refuge the first of February leaving the Assistant Refuge Manager, GS 5/7 position open until May. Gary had been at Quivira since the spring of 1985.

Dennis Orthmeyer entered duty in May as Assistant Refuge Manager, GS-07, and departed on September 28 after being selected as a wildlife biologist with Northern Prairie Wildlife Research Center at Davis, California. The position remained vacant thru the end of the year.

In December, Assistant Cartlidge accepted an assistant manager position at Carolina Sandhills National Wildlife Refuge. She has been instrumental in initiating public use management on the refuge .

Refuge Staff

Front Row: Marks, Nienke, King, Foltmer, Heath, Cartlidge
Second Row: Hall, Meggers, Orthmeyer, McCollum, Schaad
Not Pictured: Jones, Sullivan, Stout

7/87; Conrad

Youth Conservation Corps

Lonnie Hook Shelly Conrad

7/87; Cartlidge

With the funds made available for facilities rehabilitation by the reprogramming of the Resource Problems project we hired four extra temporary workers. They assisted in ditch and canal clean-out and rebuilding water control structures.

2. Youth Programs

The Youth Conservation Corps program was reduced to only two enrollees this year. The YCC crew was integrated into refuge work crew and performed well. Projects they worked on included water control structure rehab, yard maintenance and kiosk construction. Lonnie D. Hook and Shelly A. Conrad, both of Sylvia, Kansas were the enrollees. This was Lonnie's second year in the YCC program. He worked as a Enrollee Youth Leader.

3. Other Manpower Programs

Several staff days over a period of two months were spent working on a Student Conservation Association appointment. When a taker for the position finally was located, we were very relieved. The volunteer never showed up and never bothered to call. Needless to say, we were somewhat disillusioned with our SCA experience.

4. Volunteer Program

There were several volunteer projects this year. Four Boy Scouts from Hutchinson worked for a day building nesting mounds for least terns at the Big Salt Marsh. Eight Boy Scouts from Troop 184 of Great Bend also spent a day installing guard rails and completing landscaping work around the information kiosk on the Scenic Drive.

The Northern Flint Hills Audubon Society at Manhattan, Kansas adopted Quivira under the National Audubon Society's Adopt-A-Refuge program. In April some members toured the refuge and discussed possible volunteer projects. A group of members returned in October and with one staff day of refuge assistance put up 25 bluebird nest boxes on the refuge.

5. Funding

Funding was adequate in FY 87 to accomplish all planned maintenance and operations activities. Almost all funds available in regular appropriations accounts were expended. However, of the Emergency Fire funds that were estimated in the FY 87 Fire Management Program Schedule, *only about* half were spent. This was due to a lack of wildfires this year and the resignation of one of the seasonal firefighters in mid-summer.

A $50,000 Resources Problems project to study water supply problems on the refuge was reprogrammed. The funds were used to clean out refuge canals and ditches and to rehabilitate additional water control structures.

Table III

Refuge Funding by Fiscal Year

Account	FY 87	FY 86	FY 85	FY 84	FY 83
Base O&M	158,000	155,000	188,000	245,000*	191,000
Cyclic Maint. & Rehab				11,000	
Resource Problems	65,000		30,000		
Large ARMM	20,000	72,000	13,000		
Small ARMM	76,000	57,300	44,000		
Endangered Species					2,000
Expenses for Sales		10,920	12,000	9,000	9,000
Youth Programs	3,000	9,100	7,000	7,000	6,000
Quarters	3,000	6,000	7,000	5,800	5,200
Emergency Fire	15,900	11,500	2,400		
TOTALS	340,900	321,800	303,400	277,800	213,200

* Includes ARMM funding

6. Safety

There were several minor accidents but none were serious enough to result in lost time. The last lost time accident was July 2, 1986.

Table IV

Accidents and Injuries in 1988

Date	Name	Nature of Incident	Cause
3/31	Hall	Metal sliver in eye	Cutting sheet metal with out proper eye protection.
7/7	Conrad	Bruise to left forearm	Improper carrying method.
7/20	Conrad	Hit left thumb w/hammer	Improper nailing technique.
9/2	Foltmer	Nail punture, rt. foot	Incaution when walking onto concrete forms.
9/15	McCollum	Sprain of rt. ankle	Inattention to footing.
10/6	Nienke	Wind blown trash in eye	Lack of proper eye protection when handling concrete forms.

Safety meetings were held monthly usually with a selected topic and appropriate safety film. We are beginning to have trouble finding good safety films of recent vintage that have not been viewed by the staff several times.

Hearing tests were done during the last week of July. On September 30 the audiologist from Hutchinson Clinic visited the refuge to discuss with individual staff members and with the staff as a group, the baseline hearing test done in July. He also explained how hearing losses occur and how employees can protect their hearing.

CPR training was received by some of the staff again this year. Two staff members took the refresher course and three took the full 8 hour CPR course. The Refuge Safety Manual was rewritten and submitted in January. It had been several years since the last up-date.

Before the end of the year, self instruction kits for Defensive Driving were ordered from the National Safety Council. Previously the Kansas Highway Patrol came to the refuge to teach the NSC driving course. This year we did not have enough students to have the course given here and were not able to get teamed up with other courses being given around the area.

8. Other

Cartlidge served on the local Stafford Pride Committee as a representative for the refuge. The State of Kansas has had its own Pride Committee for a number of years. The program is aimed at encouraging towns and cities to clean-up, fix-up, promote economic development, better services,, etc. The Stafford Committee is interested in promoting and working with the refuge to attract visitors and provide better visitor services both on the refuge and in their local community. Quivira is their biggest drawing card for tourism. Coordinating our "Pride" efforts will enhance both programs.

F. HABITAT MANAGEMENT

1. General

A good distribution of rainfall thru the growing season assured another excellent year for habitat conditions.

2. Wetlands

For the third consecutive year, water flow on Rattlesnake Creek was abundant permitting accomplishment of most planned wetland management activities. Most water units were lowered in late spring to promote growth of desirable moist soil plants. The deeper permanent water units were kept full or near full to promote growth of submergents such as sago pondweed.

The only disruptions of planned water management occurred in late March and late May when runoff from heavy rains refilled some units or prevented draw-downs on schedule. Eight units were drained and dried out for sufficient periods to permit water control structures to be rebuilt. One of these, Unit 63, had been drained in 1986 but wet conditions that year prevented completion of work on the water control structure there. The two

Some water units were mowed to control cattails while the units were dried out for water control structure rehabilitation. Unit 29 has been heavily infested by cattail for several years.

6/87; McCollum

Soon after mowing opened the cattail canopy, smartweeds, wild millet and other desirable moist soil plants began to grow rapidly.

7/87; Cartlidge

By late summer smartweed was predominant in Unit 30. Waterfowl use of this and several similar units was heavy through the fall and early winter.

8/87; McCollum

In Unit 11, late spring grazing was the management tool used to encourage desirable duck-food producing plants. About 165 yearling cattle grazed this area removing about 124 animal unit months of forage from about 330 acres prior to June 10. Smartweed and wild millet response was very encouraging.

8/87; McCollum

growing seasons of having the unit drained had an unplanned but welcome side benefit. An 85% kill occurred on the heavy infestation of cattails in the unit.

The new water control structure in Unit 40 permits water to be discharged northward into an area of timber and rangeland. Approximately 250 acres of additional shallow temporary wetlands can be filled there. Our plan is to continue managing that area primarily for its rangeland values but to fill the shallow basins in the area after the end of the growing season. Migrating and wintering mallards will make heavy use of the area in early winter. Water will be shut off and the area drained prior to green-up in the spring.

We continued to work toward our goal of moist soil management in those units where such management is most likely to succeed. We gained control of cattails in several units by drying the units during the period of peak cattail growth. In four units cattails were mowed just after the bloom stage. This also seemed to be very effective.

Excellent results were obtained in Units 11 and 20 by using late spring grazing as a management tool. After the shallow areas were dewatered in early April, cattle were run in the units to trample the dense dead vegetation and to graze the emerging cattails. Cattle were moved in early June before the desireable moist soil plants began their fast growth. The result in both areas was high production of wild millet, three species of smartweeds and several other species fed upon by waterfowl. Our observations this year indicate that proper use of livestock and well timed water management will be as effective as cultivation or fire in producing desireable moist soil plants and controlling undesirable species.

Three years of good water conditions and minimal beaver control resulted in serious beaver problems in several units. After two years of tunnels into dikes and plugged water control structures, it has become obvious that we need a pest animal control plan.

Diversions from Rattlesnake Creek totalled 10,175 acre feet this year. This is the highest level of diversion since the refuge was established. Our diversion record would have been even higher but the flood conditions in March and May prevented us from getting accurate records during the high water periods.

4. Croplands

Four cooperative farmers cropped 1,222.3 acres in 1987. There were 531.5 acres in winter wheat, 326.3 acres in grain sorghum (milo) and 364.5 acres in summer fallow. Most of the fallow ground was planted to winter wheat in the fall.

Crop production was again good. Wheat production averaged 32.47 bushels per acre with harvested government share totalling 3,372.6 bushels. Total

Wheat rust was very prominant in several fields, especially where the early growth was lush and goose use was absent. Freezing weather seemed to stop the infestation and the regrowth in spring was excellent.

11/87; Cartlidge

Field A-12, was planted to winter wheat in September, 1986. The field is in a no-hunting zone near the Big Salt Marsh. Geese made heavy use of this field, completely stripping the sandier sites. Some wind erosion occurred. More damage was prevented by a substantial amount of litter left from last year. This sandy part of the field will be retired from crops in 1988.

1/87; Cartlidge

selling price was $5,298.68. One cooperator left 8.6 acres of refuge wheat unharvested. Pheasants, quail and other resident wildlife appeared to make heavy use of this grain.

Most of the refuge share of milo was left in the field. Milo which was sold brought in $206.96 for 142 bushels. One cooperator delivered about 600 bushels to the refuge grain bin for use as supplemental food for resident wildlife during heavy snow and potentially for use as bait in any banding projects.

Blackbirds caused substantial damage to milo in two fields. We permitted the cooperator to harvest as his share one entire field where blackbirds had taken almost half the crop prior to harvest.

Two years after completion of a new cropland management program emphasizing biological farming methods, there are several problems developing. We have not yet found a suitable legume that will easily establish in the sandy somewhat saline soils. The emphasis in the Plan on reduced tillage to prevent soil erosion is also causing a developing weed problem as we also try to cut back on pesticides. It is becoming apparent that we will probably have to abandon the locally accepted wheat-milo-fallow rotation and come up with some new ideas if we are to continue farming under the constraints of reduced chemical inputs. One alternative may be to reduce cropland acres substantially if moist soil management proves to produce sufficient amounts of waterfowl foods.

5. Grasslands

Another good year of well timed rainfall promoted excellent growing conditions and good cover by the end of the growing season. The new Rangeland Management Plan was completed too late in the season to have an affect on this year's management.

Primary tools for grassland management are grazing, fire and rest. The 13,000 acres of grassland form the most abundant habitat type at Quivira.

About 2 acres in Rice County and 5 acres near refuge headquarters were reseeded to native grasses. The area seeded in Rice County is former cropland and will form a border along cropfields at the site. This seeding completed a project began in 1986 to establish permanent cover borders around the croplands in Rice County. The headquarters area reseeding was in an old roadway that was removed after the Scenic Drive was opened last year.

Heavy seed production on several species of native grass this year and an expressed need for grass seed by other refuges encouraged us to issue three permits for native grass seed harvest. A total of 1,230 acres were harvested with switchgrass, big bluestem and indiangrass being most abundant. The best switchgrass production occurred from areas burned in late April. Much of the switchgrass appeared to have a good seed-set but upon testing, much of the seed was found to be infertile. At year's end the final tabulations have not been received from the permittees. Most of

The third consecutive year of above normal precipitation resulted in expansive growth of grasses expecially in areas that were burned in Spring. This area was burned on April 15. By early September, Sand Bluestem, Big Bluestem, and Indiangrass exceeded 6 feet in many sites.

9/87; Orthmeyer

We took advantage of the abundant grass seed production this year and issued three Special Use Permits to area seed harvesters. Switchgrass production was poorer than expected but Bluestem and Indiangrass harvest was excellent. Most of the seed is being transferred to other refuges for cropland and DNC reseeding.

9/87; McCollum

the refuge share of seed will be transferred to other refuges. Refuge share was 30% of the seed, cleaned, bagged, germination tested, and returned to the refuge.

7. Grazing

There were eleven grazing permittees this year. The grazing season was April 15 through October 15. One permittee, Arthur Schwiethale, dropped out of the grazing program at the end of the year. A new permittee, Tom Turner, was selected thru a bid process to graze a portion of the Santana Research Natural Area.

Grazing fees were increased $1.00 per Animal Unit Month from $5.30 to $6.30. This is in accordance with the grazing rate survey conducted in 1985. The surveyed rate at that time was $7.25 per AUM. Table V is a statistical summary of 1987 grazing data.

Table V.
Grazing Data for 1987

Permittee	Class of Livestock	Number	AUM's	Acres	Fee
Hamilton	C/c **	75	375	1,095	$2,362.50
Hildebrand	C/c	25	125	469	787.50
Hornbaker	C/c	18	90	271	567.00
McMurphy	C/c & Y	66	310	940	1,953.00
Miller	C/c	90	450	1,300	2,835.00
Schweizer	Y	180	432	1,145	2,721.60
Schwiethale	Y	20	75		472.50
Sleeper	Y	461	916	1,600	5,105.00
Smith	C/c	50	250	915	1,575.00
Taylor	C/c & Y	25	125	150	787.50
Turner	Y	250	291	280	* 291.00
		1,260	3,439	8,166	$19,457.60

* Bid price of $1.00/AUM.
** C/c = cow/calf; Y = yearling

The 1987 grazing program was operated much as it has been in years past with a few notable exceptions. Two permittees agreed to combine their adjacent private pasture with their permitted refuge grazing areas to form one herd. These larger single herds were then grazed both on and off the refuge in a rotation system. The numbers of AUMs utilized on and off the refuge remained the same, but, with higher stock density and shorter grazing periods in each grazing unit, better forage utilization was obtained and more desirable affects on refuge habitats resulted.

The affects were particularly noticable in the Water Unit 11 area of the refuge where 180 yearlings were grazed for about a month on 480 acres. The yearlings were moved on June 12. Smartweeds and wild millet responded with rapid and expansive growth through the remainder of the summer.

The approach of grazing season always causes an early spring rush to complete rangeland improvements. These tanks were set to hold several days supply of water. Altho Kansas is well known for its winds, several hot, calm days in summer can cause big problems for a large herd.

5/87; McCollum

Grazing by cattle is the major grassland management tool at Quivira. When properly planned and monitored, its benefits can be great for wildlife, habitat, and the grazer. This area was grazed in May and rested the remainder of the year. The cattle egrets are common livestock companions in short to mid-length grasslands but are seldom seen in dense grass over 15" high.

6/87; McCollum

In February we solicted bids for grazing the Santana Reserach Natural Area. The proposal offered 291 AUMs of grazing but also required the permittee to install temporary electric fencing so that half of the area would be grazed and the other half remained ungrazed. The grazing plan was aimed at achieving a high impact in a short time with the cattle removed from the area in time for the grasses to recover during the summer and fall.

There was only one bidder, Tom Turner of Stafford. His bid of $1.00 per AUM was accepted. Turner brought out 250 head of light yearlings on May 23. The yearlings were grazed an average of ten days in each of six 40 acre paddocks and were removed on July 21.

From the refuge perspective the action was a success. The yearlings made heavy use of poison ivy, willow, and other brushy species. The grasses made excellent recovery after grazing was completed. From the permittee's perspective, the action was less successful. The single strand poly-cord electric fence was knocked down by deer on several occasions permitting the yearlings to get out. This cost several extra man days of riding for the permittee. The ten day grazing periods were too long for good gain on the yearlings. The 1.2 pounds per day gain was much less than is expected in more traditional systems. Overall, however, the permittee was satisfied with what we had learned and is willing to try it again in 1988. Several modifications will be made to improve the grazing affects for both the permittee and the refuge. These will include shorter duration grazing periods, more secure fencing, and a grazing start on May 1.

Meetings were held with most grazing permittees during November and December to discuss the new Rangeland Management Plan and how it will affect grazing operations. Several permittees' grazing areas will be moved and season-long or deferred rotation systems previously practiced will be phased out in favor of a shorter duration, better timed, higher intensity grazing method.

8. Haying

The annual haying program was terminated in 1986. No haying permits were issued this year.

9. Fire Management

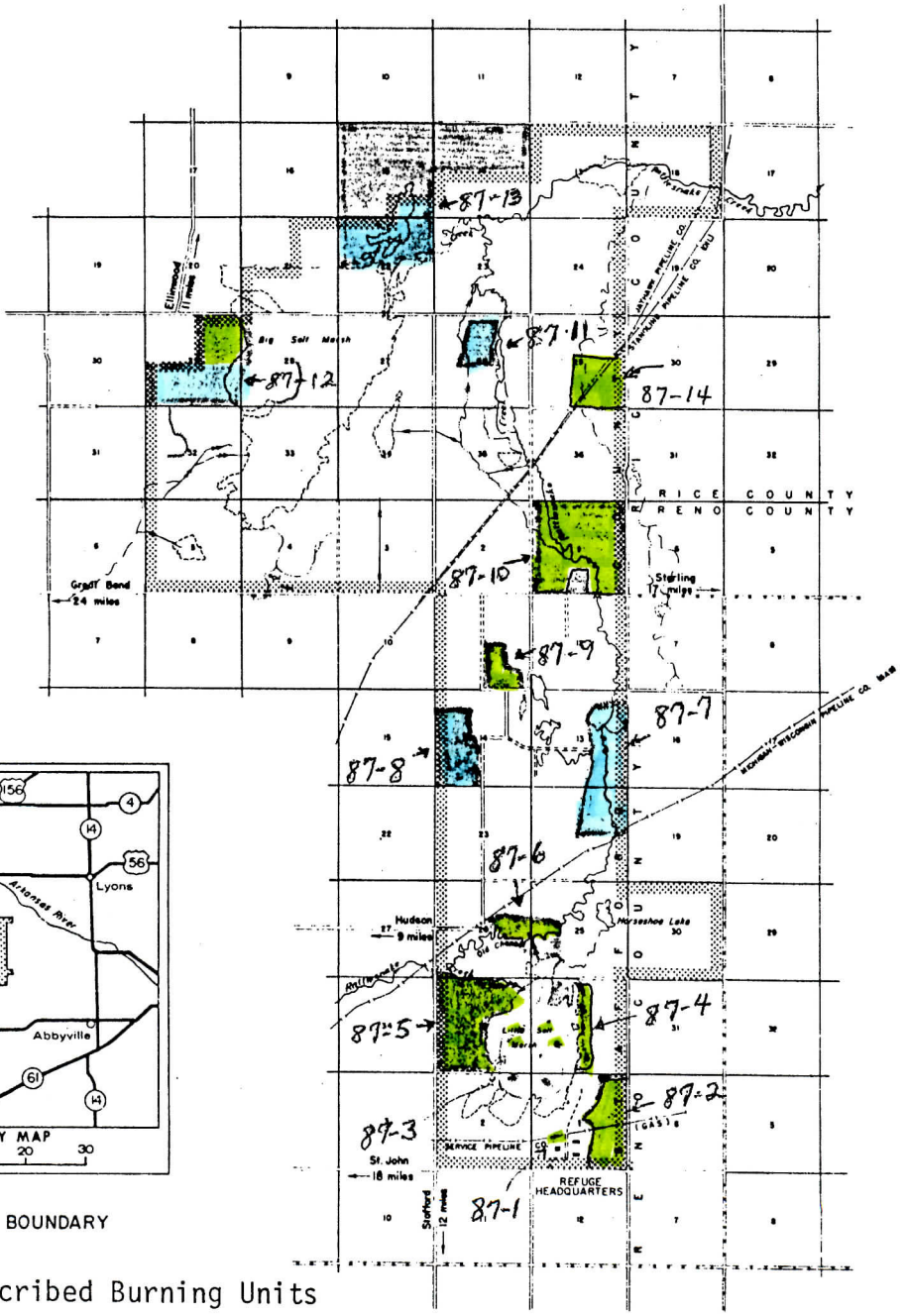
Prescribed burning is an important part of the land management program at Quivira. A total of 1,575 acres were burned this year under prescription. The following table describes 1987 prescribed burning efforts.

QU..IRA NATIONAL WILDLIFE RE..GE

STAFFORD, RICE, AND RENO COUNTIES, KANSAS

UNITED STATES DEPARTMENT OF THE INTERIOR — FISH AND WILDLIFE SERVICE

1987 PRESCRIBED BURNING
Quivira NWR



R 12 W — 98° 35' — R 11 W — 98° 30' — R 10 W

COMPILED IN SURVEYS AND MAPS FROM SURVEYS BY THE B.L.M., U.S.G.S. AND F.W.S.

SIXTH PRINCIPAL MERIDIAN

0 1 2 3 4 MILES

MEAN DECLINATION 1975

DENVER COLORADO — OCTOBER, 1981

6R KAN 477 403

Table VI.
1987 Prescribed Burning Accomplishments

Fire Name	Acres Planned	Acres Burned	Burn Date	Cost/Acre
LSM Islands (87-3)	25	2	3/12	$105.00
Schwiethale (87-2)	210	210	4/07	$ 1.17
Headquarters (87-1)	9	9	4/07	$ 9.45
LSM North (87-6)	85	85	4/08	$ 1.65
Bunkhouse (87-9)	105	105	4/08	$ 1.95
Sterling Road (87-10)	521	540	4/17	$ .85
Artesia (87-5)	320	340	4/24	$ .62
Marsh Road (87-12)	510	145	4/24	$ 1.10
LSM East (87-4)	60	60	4/29	$ 3.08
Deadhorse (87-14)	194	78	5/12	$ 6.15
Darrynane (87-7)	256	N/A*		
Water Unit 28 (87-8)	200	N/A		
Water Unit 63 (87-11)	130	N/A		
North Lake Area (87-13)	360	N/A		
General Maintenance	5	N/A		
Canal Ditches	1	1	various	$100.00
Totals	2,991	1,575		

* N/A = Not accomplished.

The objective for most burns was to hold brush and tree invasion in check. Other objectives included clearing islands in the Little Salt Marsh of tall rank vegetation to encourage nesting by Canada geese, clearing wetlands of accumulated dead cattails and reducing accumulated thatch from refuge grasslands.

The prescribed fire program went off with few problems. Much of the preparation had been completed in the fall of 1986. This was a major help in areas too wet to operate equipment in the spring. Some areas such as North Lake were too wet to effectively burn during the most optimum time.

There were no wildfires on the refuge this year. Refuge staff responded to only one fire off the refuge. On June 7, a fire rekindled from some old hay bales burned by a farmer on private land just south of refuge headquarters. One refuge employee responded and extinguished the one-tenth acre fire.

10. Pest Control

The Stafford County Noxious Weed Control Department used Sulfometuron methyl on 2.75 acres of johnson grass and dicamba on 3 acres of bindweed. Refuge staff used Banvel CST (dicamba) on tree stumps on 5 acres where trees were cleared. Also 12.4 acres of ditches and canals infested with cattail were treated with Rodeo (glyphosate). One refuge farm cooperator sprayed 94 acres with propazine to control weeds in milo. Refuge costs for chemicals and labor were $1,650.92.

In several locations beavers plugged water control structures. Three beaver were removed by refuge staff.

11. Water Rights

No checks were made this year of possible up-stream diversions.

12. Wilderness and Special Areas

The Santana Research Natural Area was grazed for the first time this year. The action is described in Section F.7. Affects of the action were positive. The area will continue to be grazed and burned in coming years to return the area to a more representative grassland community.

G. WILDLIFE

2. Endangered and Threatened Species

This was a banner year for whooping cranes at Quivira. It started early when an immature whooper was observed on February 10 with about 400 sandhill cranes. This juvenile whooper had become separated from parents and spent the winter in western Oklahoma. No other confirmed sightings of whoopers were made on the refuge during spring migration. Several sightings were reported by observers in other areas around the refuge. It was a different story in the fall. A record 38 whoopers were tallied on the refuge during the southward migration. On October 21, 20 whoopers gathered on the west side of the Big Salt Marsh. This of course, generated considerable excitement. Television news reports of the cranes brought a lot of phone calls and visitors. Unfortunately the birds departed before most visitors arrived to see them.

Five other family groups of three birds each were observed at intervals through the remainder of October. On December 4, a laggard family group of three arrived to spend 3 days resting and feeding. This last group caused the only disruption of hunting on the refuge. Hunting was closed December 4 through 6. There were 54 use days by whooping cranes observed on the refuge this year.

Interior least terns were again active nesters in the flats of Big Salt Marsh. Dr. Roger Boyd of Baker University continued his study of tern use of the refuge. He reported very disappointing results from the 1987 tern nesting efforts. It was estimated that there were 27 breeding pairs of least terns present. However, a combination of high water and predation resulted in no known production of terns on the refuge this year. This was from a total of 64 nest initiations observed by Dr. Boyd.

The little white spots are part of our fall whooping crane invasion. Even with a 400 mm lens, it is difficult to get a good photo without disturbing the birds in the flat, open terrain of Quivira. A total of 38 whoopers visited the refuge in the fall migration, 20 of these in one day October 21.

10/87; Heath

Quivira is well know for its variety and abundance of shore-birds in late spring and late summer. Avocets usually arrive in late April and many remain to nest.

5/87; Cartlidge

Dr. Boyd recommended construction of electric fence around the area most heavily used by nesting terns to prevent entry by coyotes and construction of additional raised gravel/sand pads to provide terns with nest sites less vulnerable to flooding.

Bald eagles are winter residents and are closely associated with waterfowl use of the refuge. Lower waterfowl numbers this year translated into lower eagle numbers as well. The peak number was 16 observed on December 23. Numbers averaged about 5 per week in January, February, November and December.

No peregrines were observed this year. Dr. Boyd observed a piping plover in May during a shorebird survey on the Big Salt Marsh.

3. Waterfowl

Waterfowl numbers were fairly high at the beginning of the year with about 23,000 ducks and 10,000 geese but almost all left when units froze up in mid-January.

Spring migration started about two weeks earlier than normal. By mid-February most Canada geese and mallards had departed and white-fronted geese, pintails, green-winged teal, and redheads began to show up. The spring migration was in full swing by mid-March. The high waters present on the refuge during the last part of March made census difficult. There were over 6,000 ruddy ducks and 3,000 shovelers present in early April along with an estimated 10,000 other ducks of many species. Numbers fell off rapidly until only summering birds remained by early May.

Altho water conditions remained good thru out the summer few broods of ducks were observed. A brood survey conducted on July 7 found 21 broods of 112 total young. Duck production this year is estimated at 400.

New hay was placed in the goose nesting structures in March and several new structures were erected. The resident Canada goose flock continues to grow. Production this year was estimated to be about 30 birds. Mortality in this flock is apparently fairly low because we are seeing pairs return to the same nesting site from year to year.

Fall migration was slow to develop. Duck and goose numbers were both down substantially from normal. This lack of birds brought many comments from hunters and substantial discussion and speculation about where the birds were. Fall migration peaked with 13,140 geese and 34,000 ducks present in the week of December 23. Tundra swans were observed with geese on three occasions.

An aerial survey was conducted on the 21st of October and was repeated again in November and December. We were unable to arrange a low level flight (under 500 feet above the ground) because of the increased restrictions by the Office of Aircraft Services. We found that our ground counts of waterfowl are as effective as trying to count from 500 feet.

4. Marsh and Water Birds

About 400 sandhill cranes arrived on February 10 but a cold front pushed them back south in short order. When the cranes began their main migration they quickly passed thru Quivira. Few remained for long. In the fall it was a different story. Sandhills began arriving in mid-September. Peak population was 20,000 counted on October 28. Substantial numbers of cranes remained into December with 878 being counted during the Christmas Bird Count on December 18.

It was a good year for herons and egrets. Thru out the summer dozens, even hundreds, of great blue and little blue herons, and great, snowy and cattle egrets could be found on the refuge. Great egrets were observed nesting for the first time on the refuge. They joined the great blue herons in the rookery in the Santana Natural Area cottonwood grove.

White faced ibis were believed not to have nested this year altho they were commonly seen during the summer, feeding in the shallows of Big Salt Marsh.

5. Shorebirds, Gulls, Terns and Allied Species

Shorebirds found spring migration conditions ideal when water began declining from the high flood levels of late March and early April. The earliest returnees were as usual, killdeer and snowy plovers.

Baird's and white-rumped sandpipers are probably the most abundant species of shorebird using the refuge, altho their stays are usually short. Up to 33 species of shorebirds can be seen at Quivira.

Franklin's gulls are the most numerous gull with up to 50,000 at a time stopping in during the migration. Ringbilled gulls can be found year around as long as there is open water.

6. Raptors

One golden eagle was observed several times in January in the Big Salt Marsh area. A snowy owl was seen near the old Raymond tank battery site on January 6.

Red-tailed hawks, northern harriers, and great horned owls nest on the refuge and can be seen most days of the year. A northern goshawk was observed catching a meadowlark near headquarters on January 19.

7. Other Migratory Birds

Mourning doves are common during the summer and provide some early hunting opportunities in September. No surveys are conducted to determine production or population levels. Hunting pressure was light.

Blackbilled magpies are occasionally seen. They have been known to nest here but there was no known nesting this year.

Thousands of blackbirds use the refuge each fall. The birds roost in dense cattail areas in refuge water units. Each morning they fly off to feed in milo fields in the adjacent cropland areas. Normally the milo has been harvested by the time the peak numbers arrive and the blackbirds feed on the waste grain. They often inflict substantial damage to some fields of late maturing grain.

The 1987 Christmas Bird Count produced a new record of 71 species present on December 18.

8. Game Mammals

Whitetail deer are the most noticeable game mammal on Quivira. The current population is estimated to be about 150 with an additional 100 deer using the refuge part time. Mule deer are present but much less common.

Fox squirrels and cottontail rabbits are common. The abundant grassland, brush and timbered areas provide good habitat for these species. Altho they are legal game during the refuge hunting seasons; few are taken each year. Both are usually hunted incidental to upland bird hunting.

10. Other Resident Wildlife

The refuge is home to many species of small mammals, birds, reptiles and amphibians. Coyotes, raccoons, and oppossums are very common with badgers and bobcats occasionally seen.

Bobwhite quail and ringneck pheasants draw the major share of interest because they are legal game on the refuge. Population of both species were up again this year, continuing the recovery from the crash that occured in the winter of 1983. Coveys of 12 to 18 quail were common thru most of the refuge.

Wild turkeys are also common but are not hunted (yet). About 150 to 200 turkeys use the refuge and adjacent private lands.

The high waters in March caused major problems for the black-tailed prairie dogs located northwest of Little Salt Marsh. The water table rose in the town forcing many of the rodents out of their burrows. This resulted in heavy predation and probably drowned some young. A major decrease in the population occured. The numbers did not recover and by year's end only 8 to 12 prairie dogs remained. If this population dies out, we will re-evaluate the idea of having a prairie dog town there and look at other locations better suited for a dog town.

We continue to see and get reports of prairie chickens in the northeast part of the refuge. In 1988 we plan to search for leks in the area.

11. Fisheries Resources

The shallow waters and uncertain supply reduce the possibility of having a sustainable fishery management program. Most of the fish produced in refuge waters are consumed by the large numbers of fish-eating wildlife. Small fish species are most common. These include the plains killifish, red shiners, and gizzard shad. Carp are also very common. Small carp are heavily fed upon by herons, egrets, cormorants, and pelicans. Channel catfish and bullheads are occasionally hooked by refuge visitors.

14. Scientific Collections

A special use permit was issued to Donald E. Haskard of Hutchinson, Kansas, to collect, measure, and release western massasauga rattlesnakes. This was the second year for this activity.

For the past several years Mrs. Lorena Combs of Hutchinson has collected tiger beetles from various refuge habitats. Her collections continued this year.

Dr. A. L. Youngman of Wichita State University collected seeds of several halophytic and moist soil plant species.

15. Animal Control

As discussed in Section F.10. beaver continued to be the number one pest on the refuge. Livestock panels were effective in two locations in keeping beaver out of water control structures. These had to be beaver tight tho. In one location the beavers were able to go under the panel in one spot and plug the culvert.

16. Marking and Banding

Quivira did not have a banding quota in 1987. No banding was performed by refuge staff.

17. Disease Prevention and Control

There were no known wildlife disease problems in the refuge. Disease has been very rare here. There has never been a known case of botulism. With the avian cholera problems of the Rainwater basin located only 200 miles north, we remain watchful.

H. PUBLIC USE

1. General

Traffic counters were installed in two locations to help monitor public visitation. Our estimate of 1987 visitation was 6,894. Most visitors come to hunt but we are seeing increased use of the refuge Scenic Drive and Wildlife Drive.

2. Outdoor Classrooms - Students

In October the refuge staff cooperated with the Soil Conservation Service to conduct an outdoor environmental education class for 55 eighth graders. The students came from the three junior high schools in Stafford County. The students visited each of four stations to study timbered areas, grasslands, wetlands and soils. The importance of each of these components to a healthy ecosystem was explained and discussed.

5. Interpretive Tour Routes

Exhibit panels for the information kiosk were received and installed. The kiosk was landscaped and leaflet boxes were placed adjacent to the panels.

A small panel shelter and display were built along side the Scenic Drive about a mile north of Headquarters. The panel emphasizes the history of the refuge and the importance of wildlife in the lives of people past and present.

A second one-panel exhibit was built on the Wildlife Drive. The panel there discusses the habitat of Big Salt Marsh and the diversity of wildlife which is found at the Marsh.

6. Interpretive Exhibits/Demonstrations

In July the refuge operated a booth and exhibit at the Stafford County Fair. During the two day fair, 289 persons stopped at the booth. This afforded the refuge staff an excellent opportunity to talk to a cross section of Stafford County citizens, become better acquainted with the people of the community, and tell them about the refuge.

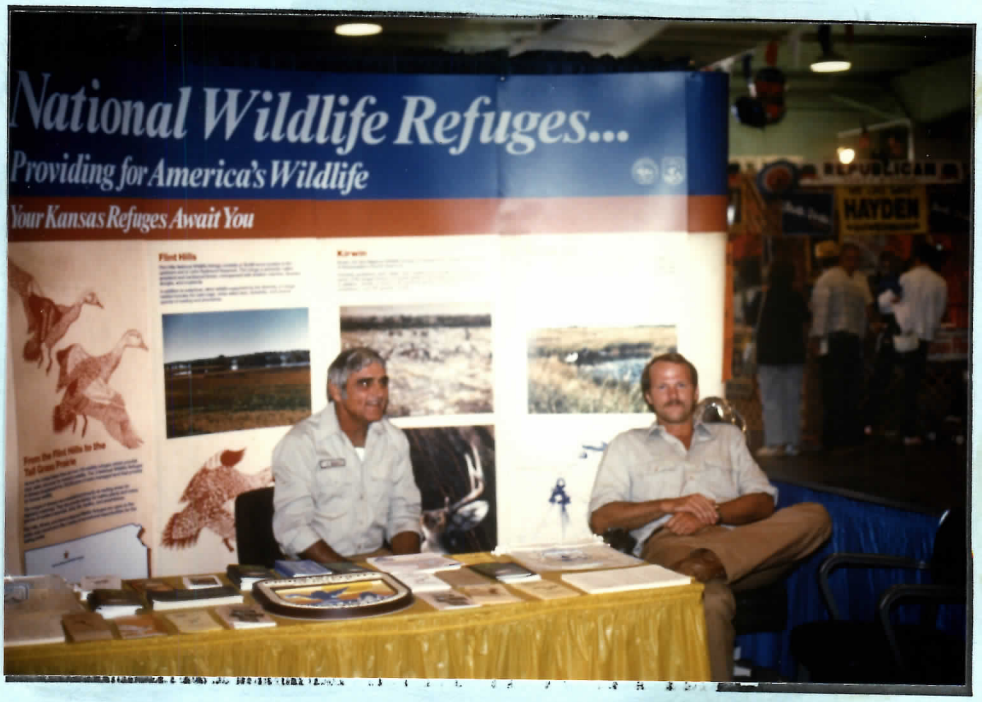
The refuge received the long delayed portable exhibit just in time for the Kansas State Fair in Hutchinson. The exhibit is a series of panels depicting in photos and text the three National Wildlife Refuges in Kansas. There are many functions each year where the exhibit can be used.

The exhibit at the Kansas State Fair was staffed for eleven days. Visitors contacted there totalled 8,768. The exhibit emphasized the three national Wildlife Refuges in Kansas. Staff from Kirwin and Flint Hills refuges operated the booth for four days while the Quivira staff handled it for the remainder of the fair. Take Pride in America leaflets, litter bags, and other FWS and National Wildlife refuge System information was also handed out.

The State Fair booth was located in the "Pride Of Kansas" building. Many fair-goers confused the Service with Kansas Department of Wildlife and Parks which has operated an exhibit for many years in another part of the fair grounds. In 1988 we are going to try to locate our exhibit along side KDWP in a mutually supporting situation. Our goal is to eventually have a separate building at the Fair that will house all the Kansas natural resource and conservation organizations' exhibits in one location.

Exhibit panels for the refuge information kiosk were received in early summer and were promptly installed. The kiosk had sat vacant for almost a year waiting for the panels to be completed and shipped. Two other small single panel exhibits were built in other parts of the refuge.

6/87; Cartlidge



For the first time, there was a National Wildlife Refuge exhibit at the Kansas State Fair. Quivira spearheaded the effort. Kirwin and Flint Hills Refuge staffs manned the exhibit four of the eleven days. We found it to be an excellent way of meeting a lot of people who would not likely get the Fish and Wildlife Service message any other way.

9/87; Cartlidge

7. Other Interpretive Programs

There were six off-refuge interpretive programs conducted by the staff this year. These were primarily for local organizations and schools. In recent years we have tried to de-emphasize the refuge staff spending a lot of time putting on programs and tours. When ever we can we encourage people to visit the refuge and see the wildlife in the wild.

In January McCollum presented a program on wildlife careers to a Fairfield High School class of 15 students. McCollum presented a slide/talk to 70 members of the Hutchinson Optimist club on February 2.

8. Hunting

Refuge hunting seasons began September 1 with the opening of dove season. Altho there were substantial numbers of doves present on the refuge, there were few hunters that pursued them. A factor which may have discouraged some dove hunters from the refuge is the "all steel shot" requirement for hunting on the refuge. We again publicized this regulation prior to hunting season. Altho number 6 steel appears to be very effective for taking doves, the ammunition is more expensive. Few hunters seem willing to use steel and hunt the refuge if they can find private land to hunt where they can use lead shot.

Teal season was September 12 thru 21. Water conditions were good and teal were well distributed throughout the refuge. Opening day hunter numbers seemed to be down from recent years. Hunters averaged taking about three birds each day of opening weekend. Hunting during mid-week was very light with only two or three parties present each day.

Regular duck season was split into three segments beginning October 24. There were large numbers of ducks present for the opener. Several hunters took limits which was not especially hard to do with the high point values assigned to most species again this year.

Success declined as the season progressed and the ducks began to use the sanctuary areas and avoid the hunting unit waters. Hunter interest also flagged except for weekends. The more popular areas were almost always well occupied. On December 24 when the third duck hunting segment opened, much of the refuge hunting waters were iced over. By year's end all water in hunting units was frozen and duck hunting had ended altho the season ran into the new year for several more days.

Goose hunting began on October 31. Generally speaking goose hunting on the refuge was poor thru out the season altho there were a few hunters who were in the right place at the right time. There were fewer geese of all species present this year than in 1986. With the warmer than normal late fall weather, many geese apparently remained further north. When cold weather did move the birds, few of them stopped here.

The geese that were here gathered in large flocks on Little Salt Marsh and and Big Salt Marsh. They usually flew en-mass to one or two feeding sites off the refuge. The sites they selected were very lightly hunted or the hunting was highly managed. That low disturbance resulted in the geese returning day after day to the same feeding areas. There was substantial grumbling by some hunters who had expensive leases that they were not getting any hunting. Some even thought the refuge was feeding the geese to keep them on the refuge. An offer to let those persons check any part of the refuge they wished to see to affirm that we were not feeding seemed to quell that rumor, but, it still did not add any geese to their bag.

Pheasant and bob-white quail hunting commenced November 7. There were substantial numbers of both species and almost all upland habitat was hunted heavily opening weekend. Throughout the remainder of November and early December there were five to ten hunters out on the refuge every day with three to four times that many present on weekends. With the abundant dense cover in hunting areas, hunters had to be very persistent, lucky, and have good dogs to limit out on pheasants or quail. Few did. As hunting pressure declined in the colder weather of late December, the numbers of birds remaining gave promise of a plentiful breeding population in 1988.

Squirrels, rabbits, snipe, and rails were also hunted and must not be ignored. But, few hunters came just for these species and very few are taken during the course of a hunting season.

9. Fishing

Fishing remains a little pursued activity on the refuge. The entire refuge is open to fishing but few visitors indulge. The shallow waters and uncertain water supply in dry years does not support a high quality fishing program. Still, a few fishermen are successful in bringing in a nice string of channel cats. The more common catch is carp or bullheads, however.

11. Wildlife Observation

Word is beginning to spread that the refuge is a good place to see wildlife in a natural setting. Compared to hunting, wildlife observation remains very low. This activity is beginning to increase, however. The whooping crane publicity brought out many who had never been to the refuge before.

12. Other Wildlife Oriented Recreation

The 22nd Annual Jayhawk Retriever Club field trial was held on the refuge April 24 thru 26. About 150 people were in attendance. Participation was down this year but enthusiasm remained high. There are always many favorable comments from participants about the high quality of refuge habitat and how unique it is in Kansas. There were no significant problems.

13. Camping

Camping is not permitted at Quivira.

14. Picnicking

There are no developed picnic areas here. A few visitors and groups bring their lunches and stop to eat along the way during their trip thru the refuge.

17. Law Enforcement

On May 5, refuge grazing permittee Vernon Taylor was checking the windmill in his grazing area when he discovered a decomposed body in tall grass near the windmill. A handgun was found at the scene. Stafford County Sheriff's officers and Kansas Bureau of Investigation were called to investigate the situation. A determination was made that the person had committed suicide. The man's car had been found on the refuge on December 24, 1986 about a quarter mile away. A search of the area near the car at that time was not wide spread enough to include the suicide site.

On September 17 two refuge visitors were found to be harvesting wild hemp on the refuge. The Stafford County Sheriff was notified and the two were arrested on a Class A misdemeanor charge of possession of marijuana.

In late November steel panel gates in four locations were driven into with a truck. Labor to remove, repair and replace the gates amounted to $300.

On December 13, night hunters took at least one deer from a wheat field along the County Road 484 in the center of the refuge. Rifle brass and footprints were found but nothing else was located sufficient to develop any leads or suspects.

Other law enforcement activities were rather routine. Following is a summary of citations issued during the refuge hunting season.

Work continued on improving directional signing around the refuge. Service owned signs replaced weather beaten county owned signs at the south entrance to the refuge. Kansas Highway Department also erected directional signs at our request on US 50 eight miles south, and on US 281 fourteen miles west of the refuge.

Two refuge visitors from New York were attracted to the refuge not by its wildlife, but, by its habitat. They were found to be harvesting wild hemp along the east boundary. The weed grows abundantly throughout Central Kansas. They were arrested by the Stafford County Sheriff and charged with possession of marijuana.

9/87; McCollum

Table VII.

Violation	No. Cases	Disposition	Total Fines
REFUGE CASES			
Unplugged shotgun	1	Forfeiture	40.00
Lead shot in steel shot zone	4	Forfeitures	200.00
Hunting ducks in closed season	4	Forfeitures	350.00
CASES TURNED OVER TO STATE			
Minor hunting with no Federal or State duck stamp, no hunter safety card in possession	1	Warning citation	
Minor with unsigned duck stamp	1	Warning citation	
Minor hunting with unplugged shotgun	1	Warning citation	
Minor hunting without a hunter safety card	1	Warning citation	
CASES TURNED OVER TO COUNTY			
Possession of Marijuana	2	5 days in Jail;	160.00

I. EQUIPMENT AND FACILITIES

1. New Construction

Permanent electric fences were built in two locations. One mile of single strand fence was built along the east side of the Santana Research Natural Area. About five-eighths mile was built in Management Unit D along the "Cities Service" road. These single strand electric fences were fully effective in enclosing both yearlings and cow/calf herds when energized with solar powered chargers.

Two foot bridges were built to provide better hunter access across West Canal. For many years hunters have had to negotiate steep canal banks and wade across the canal to reach hunting areas in Water units 28, 29, and 30. We received many favorable comments from hunters after these bridges were built in October.

Two small information kiosks were built. The first contains an exhibit about the history of the Quivira area and is located on the east side of Little Salt Marsh. The second is on the Wildlife Drive and has an exhibit about the wildlife found in Big Salt Marsh.

Dirt work was completed for a second major information kiosk to be located along County Road 484 near the center of the refuge. No other construction was accomplished there, however. A trail was built up to the site of a future observation deck. The site is located on the southeast shore

When the road began collapsing at Water Control Structure 29B, it is pretty obvious what the problem was. Corrugated metal pipe does not last long in the saline soils here. The old pipe was dug out and a new plastic irrigation pipe was installed.

6/87; McCollum

The rehabilitation of WCS 29A was the first of twelve such structures rebuilt in 1987.

6/87; McCollum

of Little Salt Marsh near the history exhibit. It should provide visitors a good view of the lake and the waterfowl that concentrate there in the fall and winter.

2. Rehabilitation

Much of the work accomplished during the summer/fall work season was rehabilitation of water control facilities. About 3.5 miles of ditches and canals which had been clogged with silt were cleaned out. Much of this clean-out work was accomplished with the Hein-Warner hydraulic excavator borrowed from Ouray NWR. We used the Quivira back-hoe to reopen the canal between Unit 61 and Unit 57 (East Lake). This permitted us to fill East Lake in September for the first time in several years.

This was a banner year for water control structure rehab. Twelve structures on nine water units were rebuilt. Three culverts which carry water diverted from West Canal to Water Units 28, 29, and 30 were also replaced. In all these structures we continued using polyvinyl chloride irrigation pipe to replace the corrugated steel pipe which was originally used. This plastic pipe shows several advantages over both concrete and steel pipe. It is practically corrosion proof and will not rust out. It is somewhat flexible and will not leak at pipe joints like concrete pipe can.

At Units 20A and 20B concrete slab spillways were poured. They replaced the old soil cement in the spillways which had broken up under past years vehicle traffic. Only two water unit control structures remain which require rehab. Those should be completed in 1988. However, there are numerous other structures in refuge canals which need repair or rehab work in the near term to continue efficient water management.

The refuge office remodeling project which began in 1985 was completed in February. The work consisted of installing insulation and paneling on interior walls. Storage cabinets and book shelves were built into the conference room and carpet was laid in all the rooms. This project has provided a much more appealing place to work than the pale green concrete block walls the refuge staffs of the past "enjoyed".

In several locations refuge maintenance access roads were rehabilitated or improved. This work included grading and adding gravel. Altho there are plenty of access roads and trails on the refuge, many of them can become impassable during wet weather. This is often the very time when water units and structures need to be checked to insure water is moving smoothly and no damage is occurring from high water.

New culverts were installed in the Scenic Drive northwest of Little Salt Marsh and in the township road along the Santana Natural Area. In both instances, old metal culvert pipes had collapsed causing water to back up and run across the road during the heavy March rains.

At most of the rehabed structures the new plastic pipe was inserted inside the old rusted out metal pipe. Concrete grout was then pumped between the pipes to insure a good seal. On four structures however, a new trench was dug to install the pipe. On these, a 4' x 8' concrete cut-off wall was poured around the pipe to prevent seepage and soil migration along the pipe.

9/87; McCollum

Reusable forms made assembly and disassembly easy and saved much time and money. The forms were built in four foot and two foot high sections. Structures of four to eight feet in height were poured with these forms.

9/87; McCollum

This six foot high structure on Unit 40 is ready for stop-logs, a little rip-rap around the side walls and lots of water.

10/87; McCollum

Another major rehab effort in 1987 was ditch and canal clean-out. Here the refuge backhoe is being used. The Hein-Warner hydraulic excavator borrowed from Ouray Refuge was much more effective for this kind of work.

8/87; McCollum

3. Major Maintenance

The high waters in late March and early April caused road damage in several places. A new culvert in the Marsh road was washed out. That pipe was reset and fill material was hauled to repair other locations on the Marsh Road washed by the high waters. On two occasions the approaches to the Rattlesnake Creek bridge on Marsh Road washed out and were refilled.

A second grain bin was moved to the headquarters from the old shop site. It was set up on a concrete foundation and a concrete floor was poured inside. One grain bin which remains at the old headquarters site will be sold and moved.

In April, in preparation for a new occupant, repairs were made at Quarters 2, the carpets cleaned and the house and garage treated for spiders and insects. The trim on the residences and office also received a new coat of earth-tone paint to cover the light green that has been traditional here.

Several staff days were used to repair the water control structure at Unit 80. This structure was built in 1984 as a mitigation project for the Whooping Crane # 2 and 3 oil well pads in Big Salt Marsh. The structure was substantially under-designed. High flows thru the structure caused leakage at some of the concrete pipe joints and a washout near the discharge end. In August a cut-off wall was poured near the end of the culvert and additional fill was placed over the pipe. Concrete rubble placed around the end of the pipe will reduce erosion caused by back-swirling water.

Pesticides were gathered from various locations and consolidated in the old brick oil house at the headquarters, along with hand sprayers, protective equipment and other related materials.

A concrete wash rack was constructed just west of the shop to provide a place for washing vehicles. Doors were installed through the interior walls of the shop building to provide access from the carpenter's shop workroom to the vehicle storage area.

4. Equipment Utilization and Replacement

In November 1985 we ordered a 4X4 half ton pick-up truck. After waiting a year and getting no word from GSA about it, we began asking questions. After several weeks of pushing and almost two years after the order went in, we learned the order had been cancelled by GSA within a few weeks after the order was submitted. For some reason communication had broken down and we ended up without the truck or the FY 86 funds we had obligated for it.

In July a Honda 4X4 ATV was purchased for a variety of tasks. The advantages of the four wheel drive capability and extra horsepower became quickly apparent when we began using the machine in the wetter areas of the refuge. The Yamaha 2X4 ATV we bought in 1985 is good but just does

Before: The canal from Unit 21 to Unit 22 is out there somewhere.

7/87; Cartlidge

After: The excavator made short work of many years accumulation of silt and cattail growth.

7/87; Cartlidge

not measure up in capability.

As was mentioned in an earlier section, a Hein-Warner hydraulic tracked excavator was borrowed from Ouray NWR. The machine was used from July thru September.

A new Polaroid instant camera was purchased to replace a Kodak instant camera we can no longer get film for. A new 400 mm lens was also purchased to be used with refuge 35 mm cameras.

A new Remington shotgun model 870P was purchased for law enforcement use.

5. Communication Systems

Most of the refuge radio desk remote sets were checked, repaired and installed in a new arrangement of the two-way radio system. The radio base station was moved to the refuge shop to provide more space in the office conference room.

A new multi-channel Motorola Syntor mobile radio was purchased. It will give us capability to communicate with the Stafford County Sheriff and County Fire Department as well as refuge radios. This radio will be installed in the next new vehicle we receive.

6. Computer Systems

After waiting impatiently for many years this was finally the year of the computer at Quivira. In July we received a NEC Powermate I with a 40 megabyte hard disk. A Fujitsu DL2400 printer came as part of the package. The computer has an advanced color graphics capability and high quality color monitor.

After about half a year to get acquainted with the machine, some of the staff is beginning to develop substantial skill. Our next challenge will be to get the modem hooked up so we can join the electronic mail system.

7. Energy Conservation

In December the maintenance crew installed insulation in both overhead doors in the vehicle maintenance bay. This work was long over due and produced an immediate and noticeable effect in the shop. The area became much easier to warm and keep warm. There are several other actions which we are planning to improve energy efficiency in the refuge shops.

J. OTHER ITEMS

1. Cooperative Programs

There were several cooperative programs the refuge participated in this year. The staff continues to monitor the U.S. Geological Survey gaging station on Rattlesnake Creek and provide weekly observations to USGS.

The refuge also cooperates with Kansas Department of Wildlife and Parks, National Wildlife Federation, and National Audubon Society in conducting a variety of wildlife surveys and counts during the year.

2. Other Economic Uses

With an up-tick in oil prices early in the year, there was a surge in leasing and drilling inquiries on the refuge. Three oil wells were drilled during the year.

General Oil Company of Wichita, Kansas purchased drilling rights under a permit issued to DynOil, Inc. of Englewood, Colorado. They drilled a well on the existing Whooping Crane drilling pad in Big Salt Marsh. An environmental assessment had approved this project in 1986. Using slant drilling techniques the company reached a formation that produced up to 80 barrels of oil per day after the well was completed.

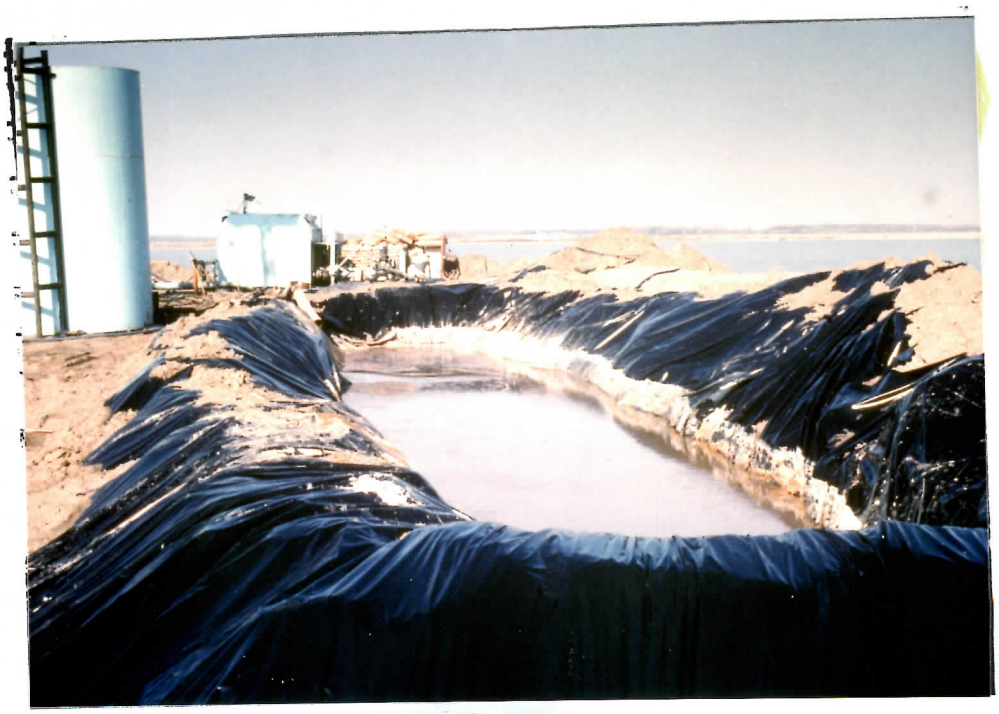
After that success the company decided to try again. From the same location and using slant hole methods again, they drilled north from the pad. That venture was an apparent failure. During the drilling phase, the drill stem became stuck in the hole. A special alignment tool costing over $70,000 was lost when the drill string had to be "shot" off 3,000 feet below the surface. The well was completed on December 24th and was apparently a dry hole.

The third well was drilled in the Ericksen lease in an attempt to forestall the loss of minerals ownership on the tract. With the minerals ownership reservation due to expire in October, the minerals lease holder requested a permit to drill in September. An environmental assessment was completed and the well was drilled in mid-October. It resulted in a dry hole.

There were very few oil or salt water spills this year. Apparently our close monitoring and efforts to keep productions sites clean are beginning to pay off. An oil facilities inspection in April found a small leak and water standing in the emergency pits of an Aspen Drilling tank battery site. The company responded promptly to our call about the problem.

Oil drilling interest was high this year. General Oil Company purchased operating interest in the Whooping Crane wells and lease. They used slant drilling techniques to reach a productive zone under Big Salt Marsh.

3/87; Cartlidge



General Oil Company was very observant of all conditions of their Special Use Permit. All drilling fluids, cuttings, muds, etc. were contained in lined pits and disposed of off the refuge. This well was producing about 80 barrels per day of oil late in 1987.

3/87; Cartlidge

Kiwanda Energy Company drilled a well on the Erickson lease in October. Because it was an upland site, the special conditions were not as restricted as on the General Oil Company permit. Unlined working pits were permitted.

10/87; McCollum

We learned some important lessons from this operation. The bottoms of the pits penetrated the water table and have been very difficult to dry up. Large amounts of salt water were pumped into the pits during drilling and soaked into the water table before the brine could pumped out. Several changes will likely be made in the conditions of future permits to prevent a reoccurrence of such contamination.